Amino Acids Classifications

Share & Care Group

• MEMA *_*

Name + abb.	Structure	chemical	Polarity of side chains	Biological (nutritional)	Metabolic	Notes
		classifications				
Glysine gly = G	COOH NH_3^+ – C – H H	Neutral	none-Polar	Non-essential	glucogenic	- Optically inactive.
Alanine ala = A	COOH NH_3^+ – C – H CH_3	Neutral	non-polar	Non-essential	glucogenic	
Valine Val = V	COOH NH_3^+ – C – H CH CH_3 CH_3	Neutral	non-polar	essential	glucogenic	
Leusine Leu = L	COOH NH_3^+ – C – H CH_2 CH CH_3 CH_3	Neutral	Non-polar	essential	Ketogenic	
Isoleusine ile = I	COOH NH_3^+ – C – H H – C – CH_3 CH_2 CH_3	Neutral	non-polar	essential	mixed	
phenylalanine phe = F	COOH NH_3^+ – C – H CH_2 (benzene ring)	Neutral	non-polar	essential	Mixed	Aromatic benzyne
Tryptophan Trp = W	COOH NH_3^+ – C – H CH_2 C ‖ CH N–H (indole ring)	Neutral	non-polar	essential	mixed	Aromatic INdole group benzyne
Methionine met = M	COOH NH_3^+ – C – H CH_2 CH_2 S CH_3	Neutral	non-polar	essential	glucogenic	Sulfur group

Serine Ser = S	COOH NH_3^+ – C – H H – C – OH H	Neutral	polar-non-ionized	non-essential	glucogenic	- it has oxyle group (OH)
Threonine Thr = T	COOH NH_3^+ – C – H H – C – OH CH_3	Neutral	polar-~~non~~ non ionized	essential	glucogenic	oxyle group
Tyrosine Tyr = Y	COOH NH_3^+ – C – H CH_2 (benzene ring) OH	Neutral	polar non-ionized	non-essential	Mixed	oxyle group aromatic Phenyl
Aspargine Asn = N	COOH NH_3^+ – C – H CH_2 O = C – NH_2	Neutral	polar non-ionized	non-essential	glucogenic	Amid group or carbonyle
Glutamine Gln = Q	COOH NH_3^+ – C – H CH_2 CH_2 O = C – NH_2	Neutral	polar non ionized	non-essential	glucogenic	Amid group carbonyle
Cysteine Cys = C	COOH NH_3^+ – C – H CH_2 SH	Neutral	polar non ionized	non-essential	glucogenic	~~Sulfur~~ group sulfidryl
Aspartic Asp = D aspartate	COOH NH_3^+ – C – H CH_2 O = C – OH	acidic	polar ionized	non-essential	glucogenic	mono amind dicarboxyle
Glutamic Glu = E glutamate	COOH NH_3^+ – C – H CH_2 CH_2	acidic	polar ionized	non-essential	glucogenic	mono amine di carboxyle

imidazolium guanidinium

Histidine His = H	COOH, $\overset{+}{NH_3}$-C-H, CH_2, C=CH, $\overset{+}{HN}$ NH, C-H	Basic	polar ionized	essential semiessential	glucogenic	mono carboxylic diamino imidazolium ~~Immidazole~~ group
Lysine Lys = K	COOH, $\overset{+}{NH_3}$-C-H, β CH_2, γ CH_2, δ CH_2, ε CH_2, $\overset{+}{NH_3}$	basic	polar ionized	essential	~~glucogenic~~ ketogenic	monocarboxylic diamino epsilon
Arginine Arg = R	COOH, $\overset{+}{NH_3}$-C-H, CH_2, CH_2, CH_2, NH, C=$\overset{+}{NH_2}$, NH_2	basic	polar ionized	essential semiessential	glucogenic	mono carboxylic diamino guanidinium group

Classifications of amino acids:-

1- chemical classification:-

according to the number of acidic and basic groups:-

15 neutral : G A V L I F W M P
S C T Y N Q

2- acidic : D E

3- Basic : K R H

2- Polarity :

in physiological pH

9- Non-Polar-Non-ionized : G A V L I F W M P

6- Polar - Non - ionized : S C T Y N Q

5- polar - ionized : D E K R H

3- Biological Classification:- (Nutritionally)

10- Essential: Can't be formed in the body, it is essential to be taken in a diet, Their ~~diffe~~ deficiency affects growth

1- Non-essential: are formed in the body in amount enough for adults and children. G A P S C Q N D E Y

2- Some times & Semiessential: are formed in the body but not in sufficient amount for body requirments especially in children.
H - R

3- Metabolic Classification:-
according to metabolic or degradation products of a.a:

1- Ketogenic a.a: gives ketone bodies L, K (pure ketogen)

2- Mixed Ketogenic and glucogenic a.a. gives both ketone bodies and glucose. I F Y W

3- glucogenic a.a: gives glucose.
by catabolism yields products that enter in glycogen and glucose formation.
G A V T M P S C Q N D E R H

Polarity :-

① N, N

$$NH_3^+ - \underset{\underset{R}{|}}{\overset{COOH}{|}}{C} - H \quad (CH_2)_n$$

② P, N

$$NH_3^+ - \overset{COOH}{|}{C} - H \quad (CH_2)_n \quad X$$

③ P, I

$$NH_3^+ - \overset{COOH}{|}{C} - H \quad (CH_2)_n \quad NH_3^+ \;/\; COO^-$$

X = ~~None~~ polar neutral groups:-
- Hydroxyl (OH) = S T Y
- Sulfidryl (SH) = C
- Amide ($\overset{O}{\|}{C}NH_2$) = Q N
- Indol group 1 = (Try) W

4- Rare type of A.A (post-Transulation modification)
- Hydroxy proline (found in collagen)
- Hydroxy lysine (found in collagen)
- N-methyl lysine (found in myosine)
- Cystine = 2 cysteine (disulfied compound)

Non portein A.As:-
- Citrullin and Ornithin
- β-Alanine
- DOPA
- taurine
- D- Glutamate